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(54) **VISUALLY MODELING SCREEN-FLOWS IN COMPONENT-ORIENTED WEB-BASED SYSTEM**

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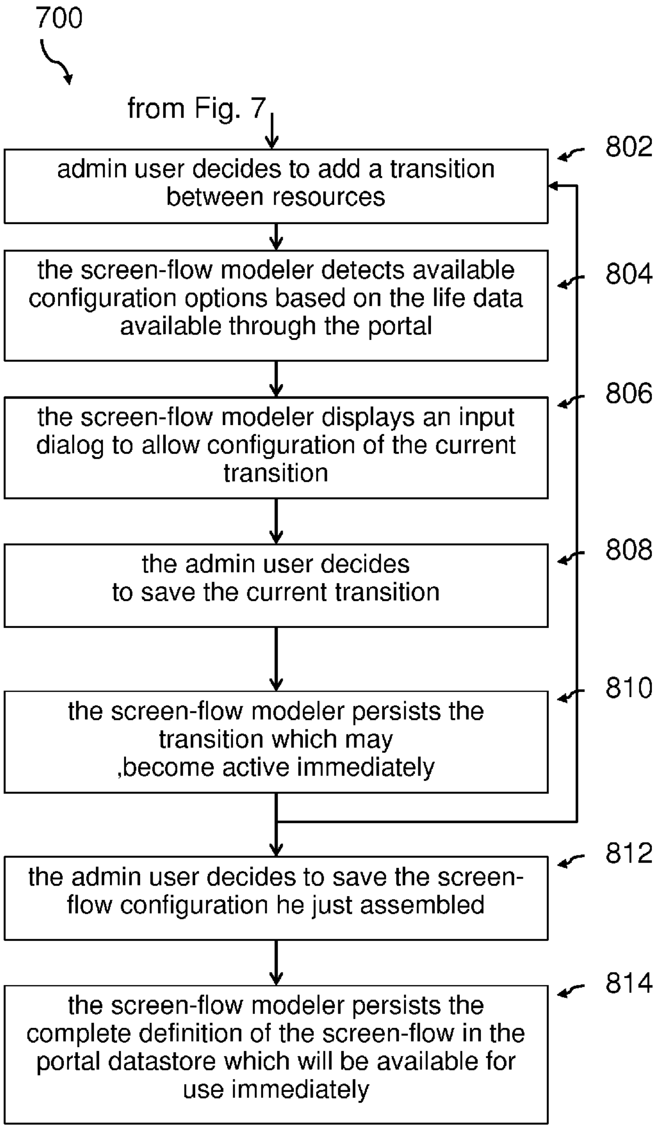
(57) **ABSTRACT**

A method includes selecting portal resources of a portal system within a graphical modeling tool. Data fields of the selected portal resources are mapped to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources. The execution flow path is stored as a portal resource in the portal system.


700
from Fig. 7
admin user decides to add a transition between resources
802
the screen-flow modeler detects available configuration options based on the life data available through the portal
804
the screen-flow modeler displays an input dialog to allow configuration of the current transition
806
the admin user decides to save the current transition
808
the screen-flow modeler persists the transition which may ,become active immediately
810
the admin user decides to save the screen-flow configuration he just assembled
812
the screen-flow modeler persists the complete definition of the screen-flow in the portal datastore which will be available for use immediately
814

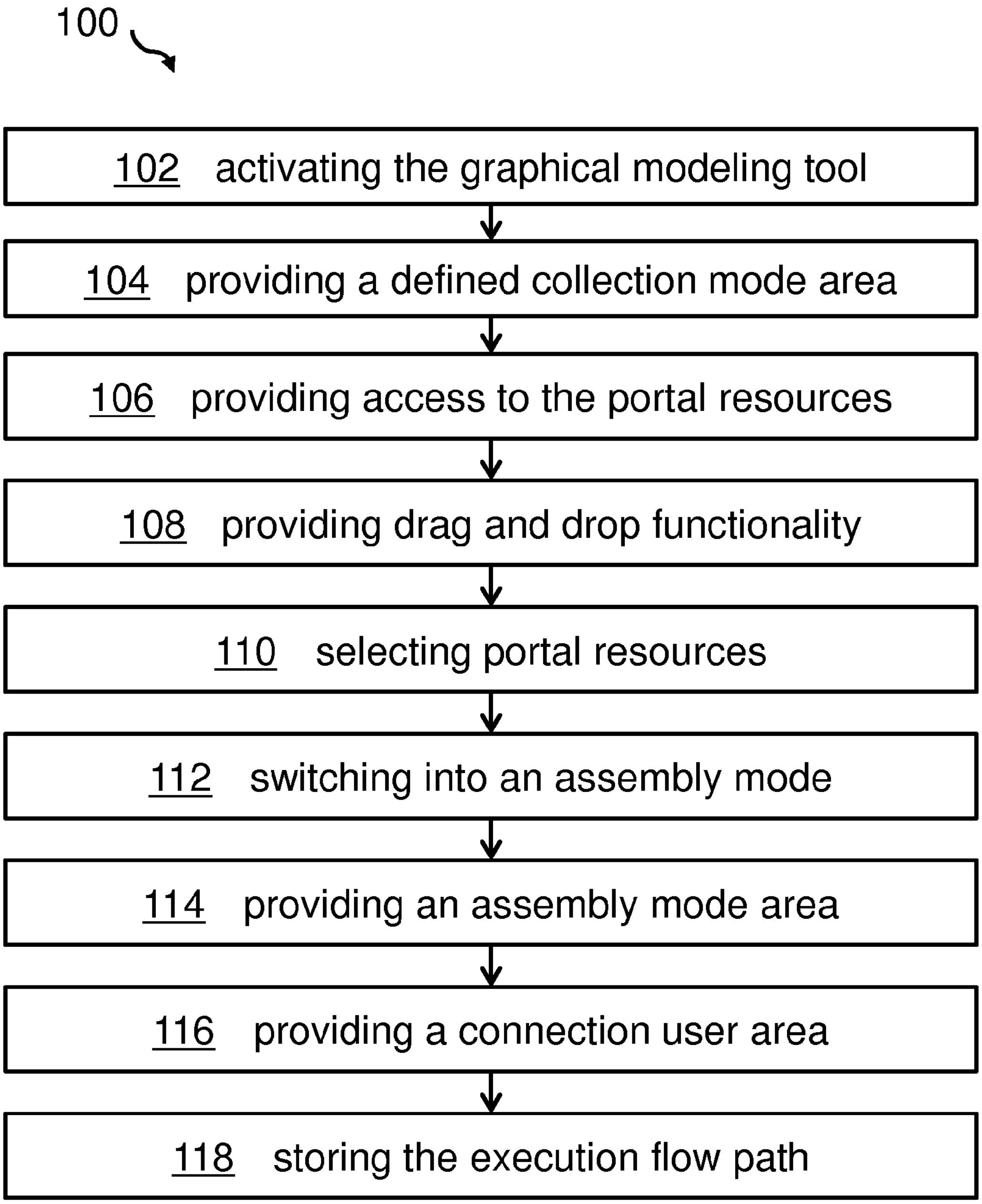

100
102 activating the graphical modeling tool
104 providing a defined collection mode area
106 providing access to the portal resources
108 providing drag and drop functionality
110 selecting portal resources
112 switching into an assembly mode
114 providing an assembly mode area
116 providing a connection user area
118 storing the execution flow path

FIG. 1

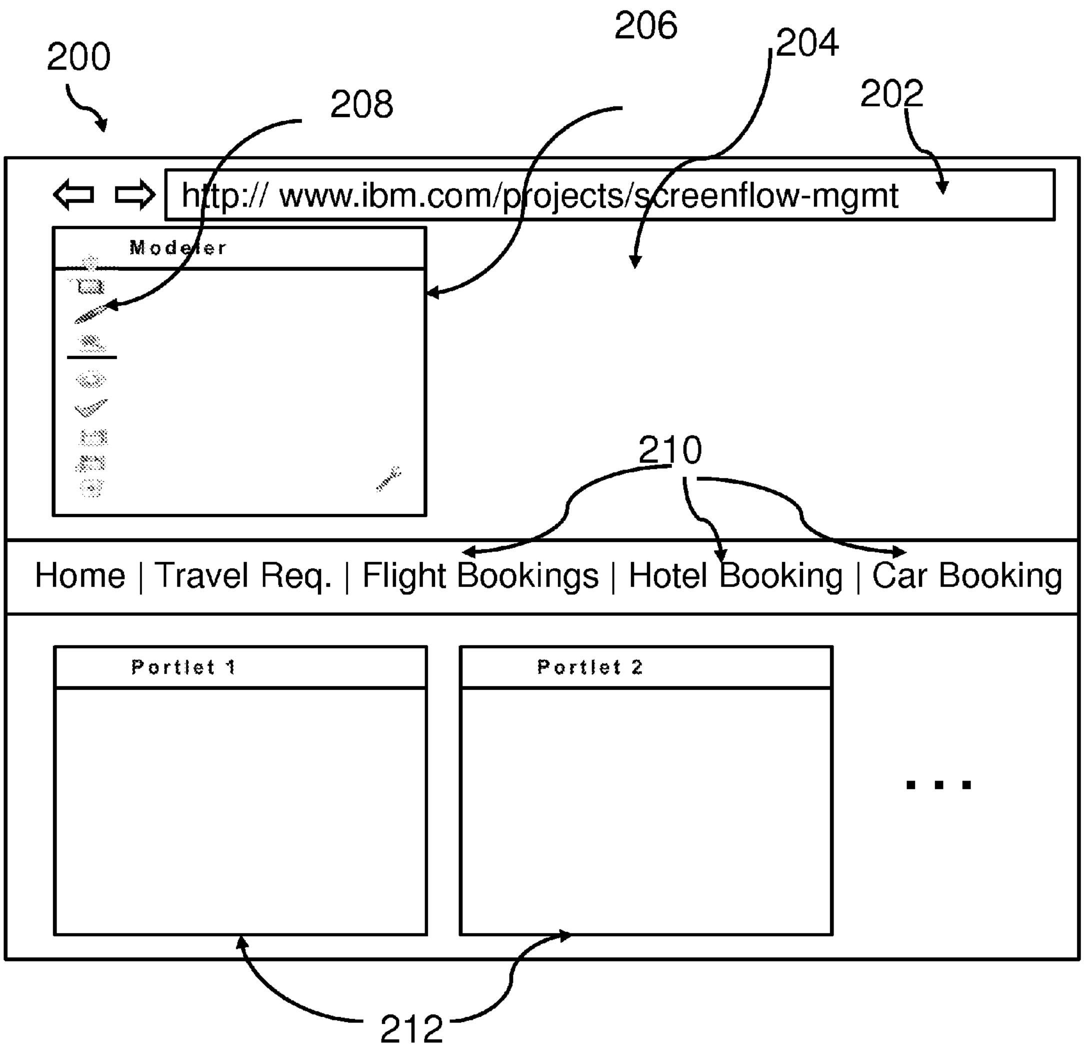

200
208
206
204
202
http:// www.ibm.com/projects/screenflow-mgmt
Modeler
210
Home | Travel Req. | Flight Bookings | Hotel Booking | Car Booking
Portlet 1
Portlet 2
. . .
212

FIG. 2

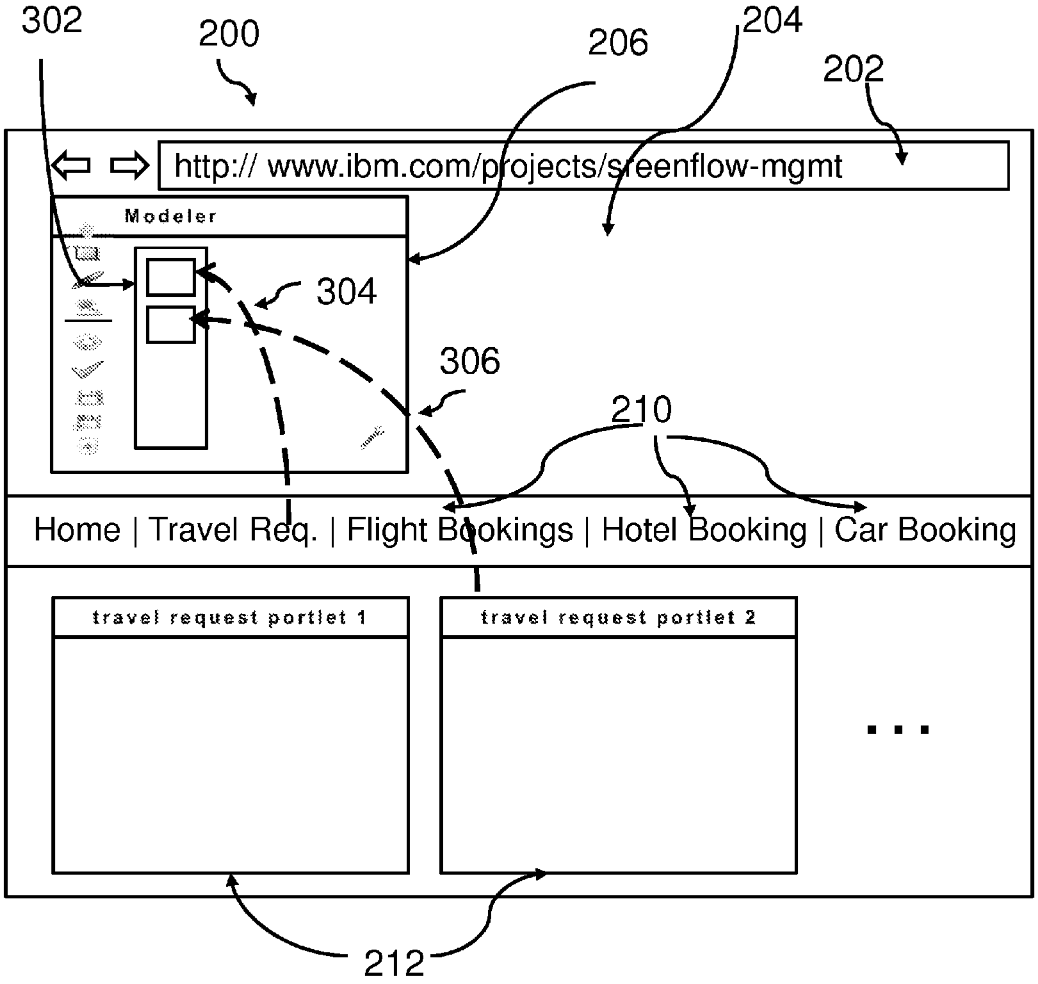

302
200
206
204
202
http:// www.ibm.com/projects/sreenflow-mgmt
Modeler
304
306
210
Home | Travel Req. | Flight Bookings | Hotel Booking | Car Booking
travel request portlet 1
travel request portlet 2
...
212

FIG. 3

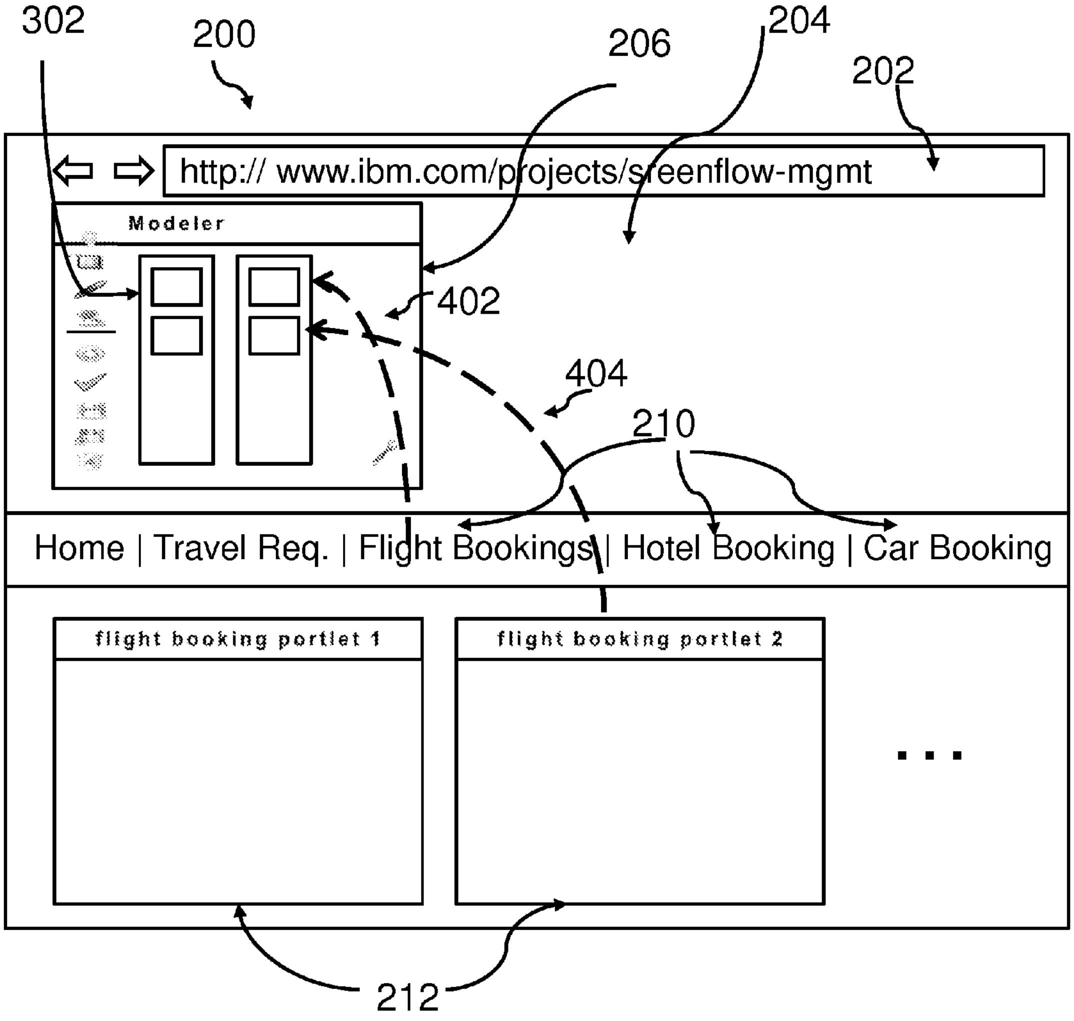

302
200
206
204
202
http:// www.ibm.com/projects/sreenflow-mgmt
Modeler
402
404
210
Home | Travel Req. | Flight Bookings | Hotel Booking | Car Booking
flight booking portlet 1
flight booking portlet 2
...
212

FIG. 4

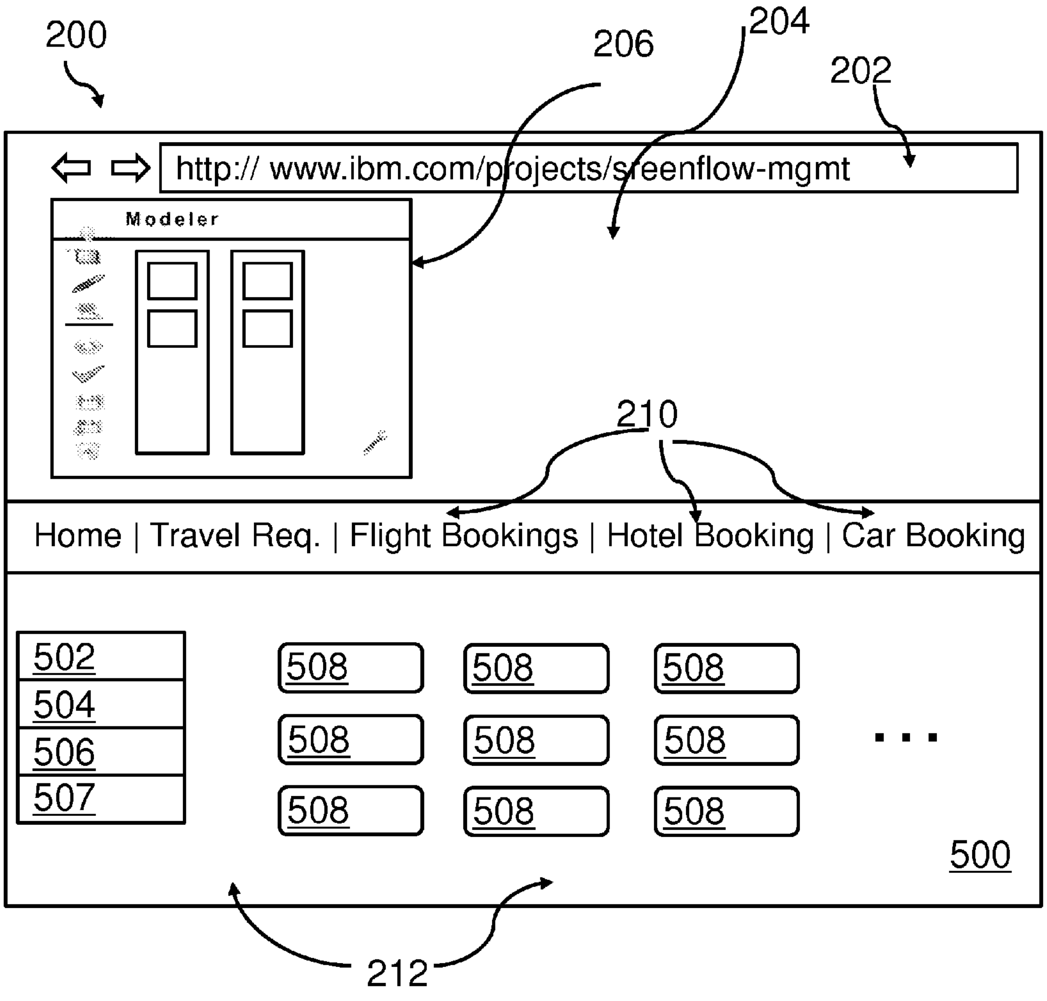

200
206
204
202
http:// www.ibm.com/projects/sreenflow-mgmt
Modeler
210
Home | Travel Req. | Flight Bookings | Hotel Booking | Car Booking
502
504
506
507
508
508
508
508
508
508
508
508
508
...
500
212

FIG. 5

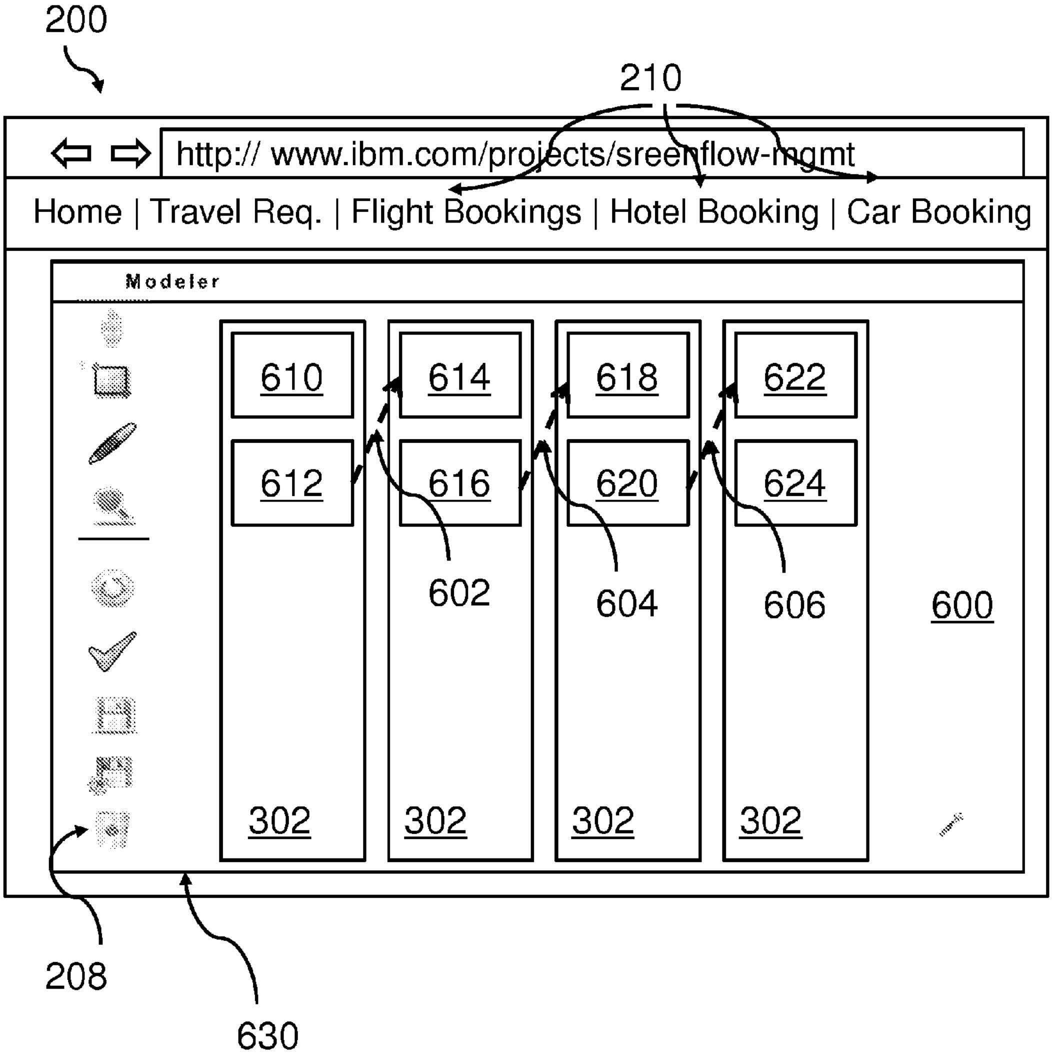

200
210
http:// www.ibm.com/projects/sreenflow-mgmt
Home | Travel Req. | Flight Bookings | Hotel Booking | Car Booking
Modeler
610
612
614
616
618
620
622
624
602
604
606
600
302
302
302
302
208
630

FIG. 6

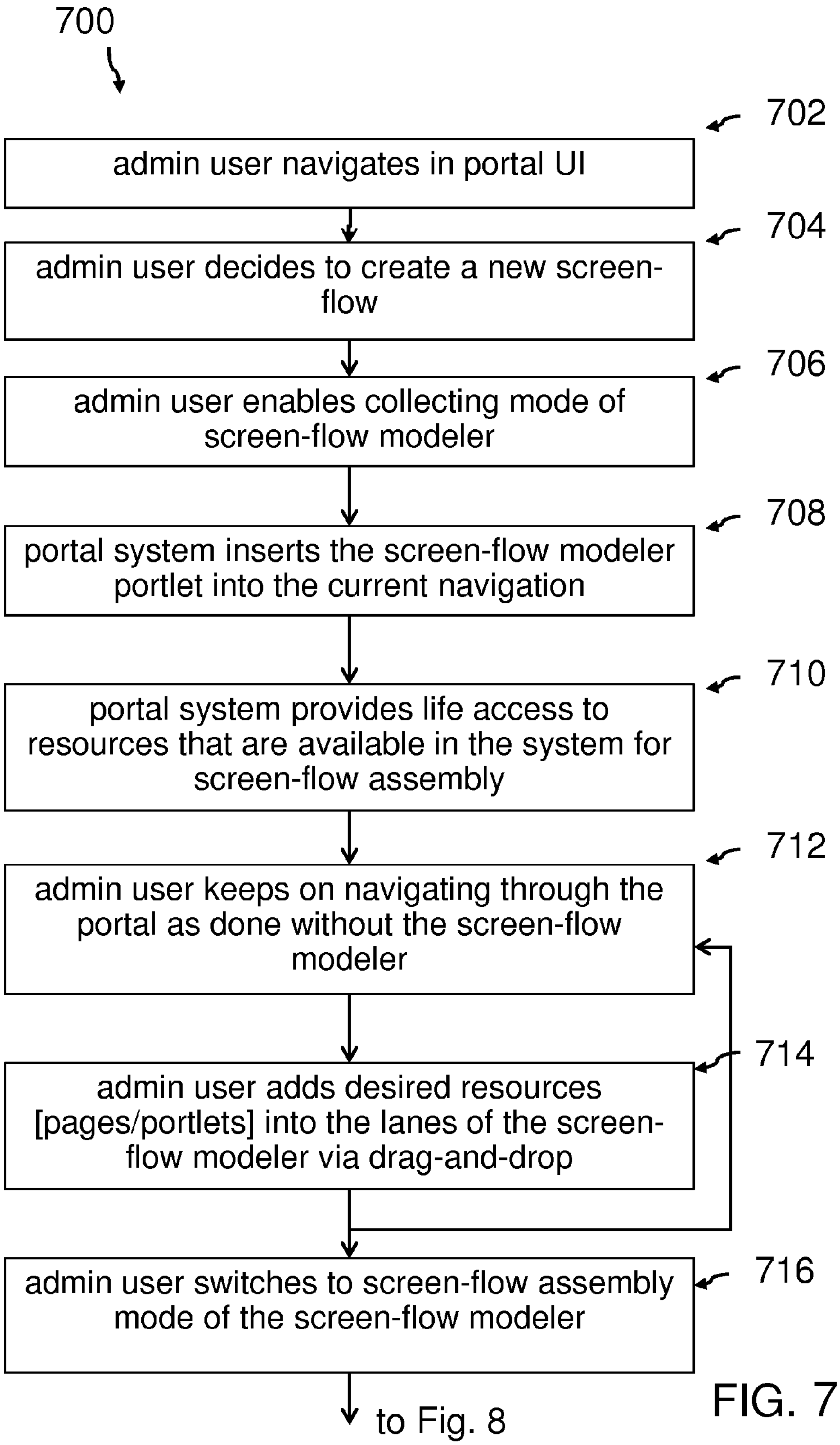
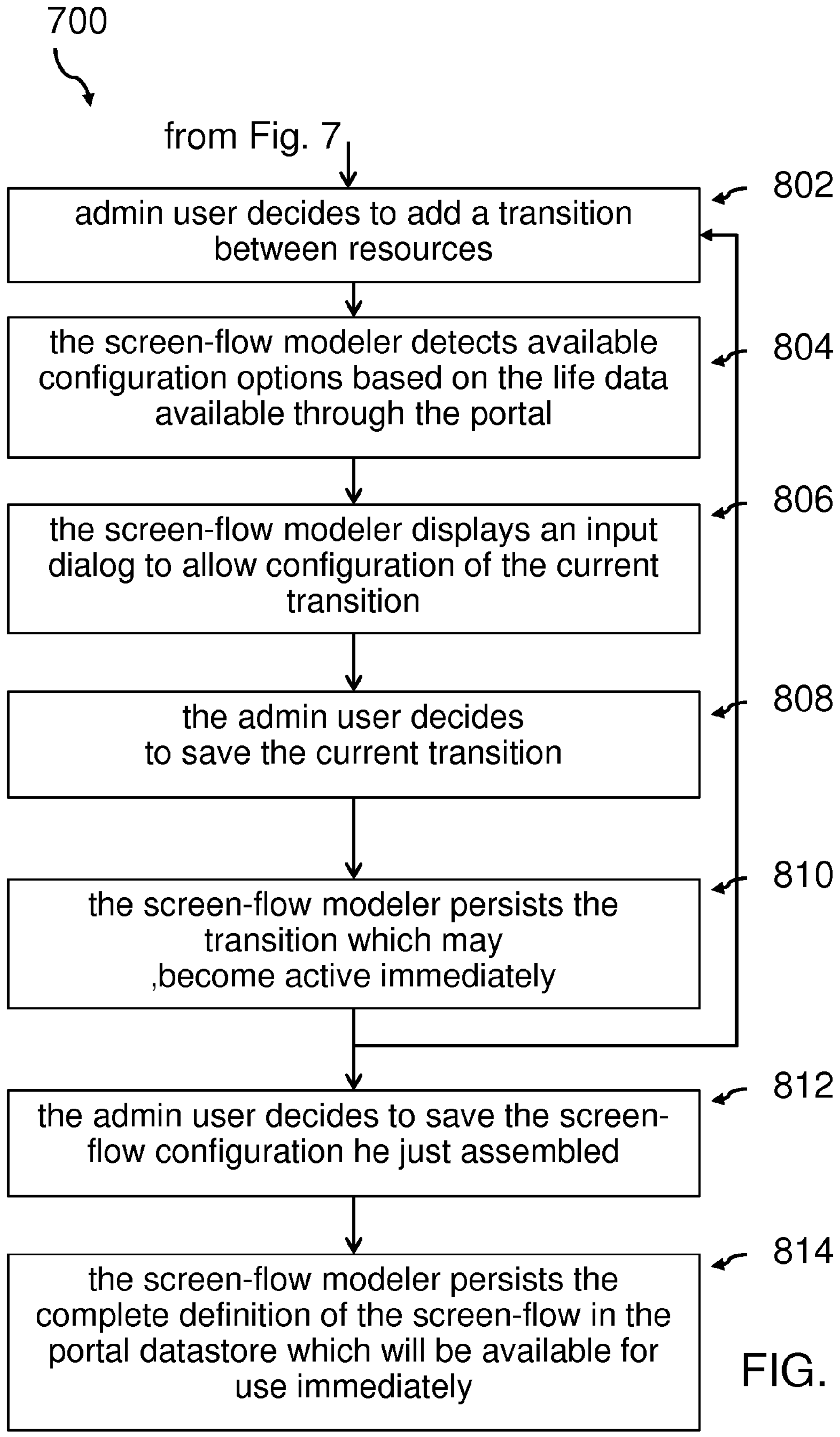

700
702
admin user navigates in portal UI
704
admin user decides to create a new screen-flow
706
admin user enables collecting mode of screen-flow modeler
708
portal system inserts the screen-flow modeler portlet into the current navigation
710
portal system provides life access to resources that are available in the system for screen-flow assembly
712
admin user keeps on navigating through the portal as done without the screen-flow modeler
714
admin user adds desired resources [pages/portlets] into the lanes of the screen-flow modeler via drag-and-drop
716
admin user switches to screen-flow assembly mode of the screen-flow modeler
to Fig. 8

FIG. 7


700
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804
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806
the admin user decides to save the current transition
808
the screen-flow modeler persists the transition which may ,become active immediately
810
the admin user decides to save the screen-flow configuration he just assembled
812
the screen-flow modeler persists the complete definition of the screen-flow in the portal datastore which will be available for use immediately
814

FIG. 8

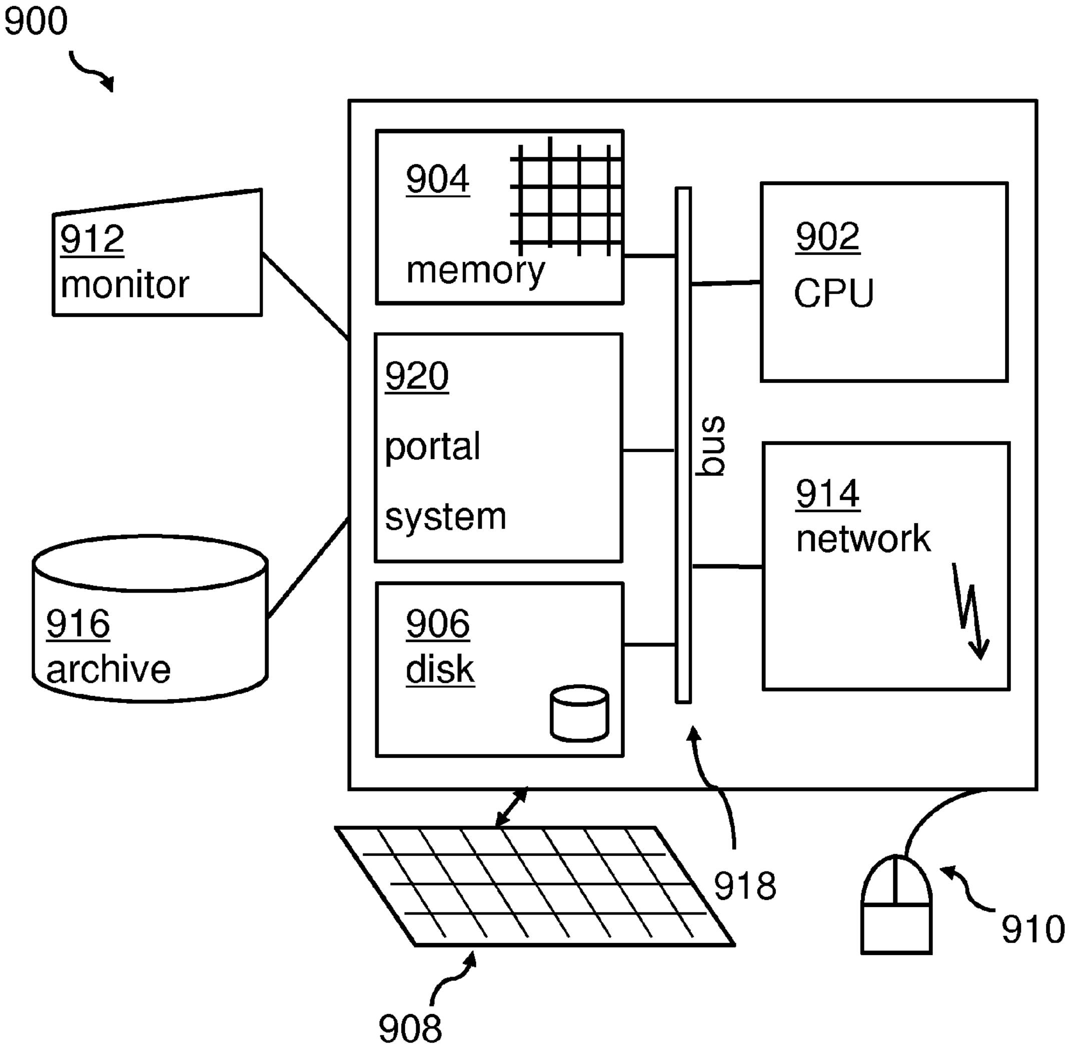
900
904
memory
902
CPU
912
monitor
920
portal
system
bus
914
network
916
archive
906
disk
918
910
908

FIG. 9

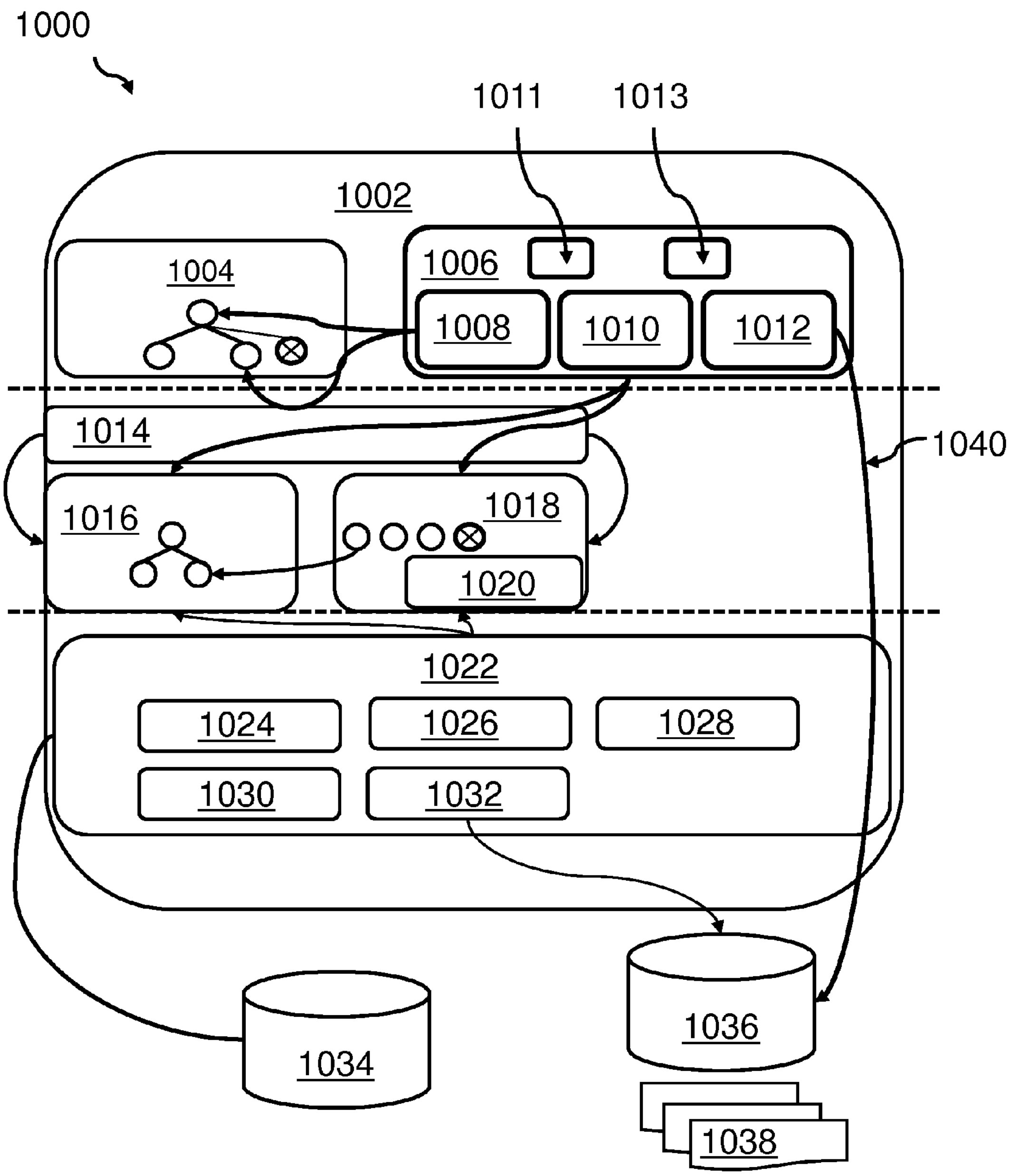
1000
1011
1013
1002
1004
1006
1008
1010
1012
1014
1040
1016
1018
1020
1022
1024
1026
1028
1030
1032
1034
1036
1038

FIG. 10

VISUALLY MODELING SCREEN-FLOWS IN COMPONENT-ORIENTED WEB-BASED SYSTEM

FOREIGN PRIORITY

[0001] This application claims priority to United Kingdom Patent Application No. 1320454.0, filed 20 Nov. 2013, and all the benefits accruing therefrom under 35 U.S.C. §119, the contents of which in its entirety are herein incorporated by reference.

BACKGROUND

[0002] Embodiments relate generally to a method for visually modeling screen-flows. Embodiments relate further to a portal application development system, a computing system, a data processing program, and a computer program product.

[0003] Customers often have to implement portal/portlet based solutions that guide users through a well-defined sequence of screens. These sequences route users along paths which interconnect user interface (UI) artifacts (forms, masks, etc.) that, altogether, allow them to easily accomplish particular tasks. From a user perspective, stepping through such sequences feels like navigating with wizards. It relieves users from thinking about the right order of navigation and processing of screens.

[0004] The need for such solutions arises across all vertical industries. E.g., in the insurance sector, screen-flow modelers might need to model flows for processing policy quotes or claim submissions. In particular, quoting a vehicle insurance policy may be comprised of steps like vehicle selection, vehicle data specification, insurance data collection, tariff characteristics selection, and so forth. Similar applications can be thought of when thinking of banking, help desks, or travel booking applications.

[0005] When developing portal based solutions, screens (in other words functions) are usually provided by portlets. But the mapping of individual screens to portlets is often not trivial since it has impact on both user experience as well as reusability.

[0006] Users have typically had to pick between two extremes. On the one hand, they can decide to let one single portlet provide all necessary screens (and thus, the entire set of functions needed to accomplish a particular task). On the other hand, they can decide to develop one dedicated portlet for each of these screens and thus, for each single function required to accomplish a particular task. The "one portlet fits all" approach implies developing one single monolithic application which is, due to its complexity, hard to maintain, poorly scalable and, due to its non-modular character, difficult to reuse. However, this approach provides developers and screen-flow modelers with the highest control for guiding users through the flow. In contrast, the "one portlet per screen"-approach offers much higher flexibility and increases options for reusability tremendously. Hence, guiding users becomes less strict and less controllable which may increase the danger of erroneous navigation. Hence, either developers have to "hard-wire" portlets which may reduce flexibility or, users have to find out about the intended flow which may increase the risk for incorrect usage. In general, there is no single right answer for the "right" granularity which often leads to time consuming discussions and decisions depending on the actual scenario to be implemented.

[0007] There are several approaches for developing portal based workflows. Document US 2013/0152021 A1 discloses a method for providing workflow stages and integrated workflow stage visualization including displaying a detailed view of a workflow. The workflow may include a plurality of customizable stages. At least a first workflow stage is configured to contain a plurality of customizable workflow components and displaying them in a detailed view. Then, a selection of a stage view within the workflow may be received.

[0008] Document U.S. Pat. No. 8,271,541 B2 discloses a method for developing composite applications. A model architecture component can model a business rule utilizing at least one node in a hierarchical structure. A runtime engine can automatically create a complex, long running composite application based at least in part upon the hierarchical node structure such that the representative process segments of the application are involved by the business rule.

SUMMARY

[0009] Embodiments relate to methods, systems, computer program products, or apparatuses for visually modeling screen-flows.

[0010] According to an embodiment, a method includes selecting portal resources of a portal system within a graphical modeling tool. Data fields of the selected portal resources are mapped to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources. The execution flow path is stored as a portal resource in the portal system.

[0011] According to another embodiment, a system includes a processing unit and a memory. The system is configured to select portal resources of a portal system within a graphical modeling tool. Data fields of the selected portal resources are mapped to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources. The execution flow path is stored as a portal resource in the portal system.

[0012] According to another embodiment, a computer program product includes a computer readable storage medium having program instructions embodied therewith. The computer readable storage medium is not a transitory signal per se and the program instructions are executable by a processor to cause the processor to perform a method. The method includes selecting portal resources of a portal system within a graphical modeling tool. Data fields of the selected portal resources are mapped to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources. The execution flow path is stored as a portal resource in the portal system.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0013] Embodiments of the invention will now be described, by way of example only, and with reference to the following drawings:

[0014] FIG. **1** shows an overview block diagram of an embodiment;

[0015] FIG. **2** shows an embodiment of a screen layout with a graphical modeling tool and portal resources;

[0016] FIG. **3** shows an embodiment of how portal resources are collected in the defined collection mode area;

[0017] FIG. **4** shows another embodiment of how portal resources are collected in the defined collection mode area;

[0018] FIG. **5** shows an embodiment of how icons and a search function may be integrated into the user interface;

[0019] FIG. **6** shows an embodiment of a layout and function of the assembly mode;

[0020] FIG. **7** shows the first part of a detailed block diagram of an embodiment;

[0021] FIG. **8** shows the second part of a detailed block diagram of an embodiment;

[0022] FIG. **9** shows a block diagram of an embodiment of a computer system including the portal application development system; and

[0023] FIG. **10** shows a block diagram of an embodiment of a portal system with elements of the proposed expansion regarding visually modeling screen-flows in a component-oriented Web-based system.

DETAILED DESCRIPTION

[0024] In the context of this description, the following conventions, terms and/or expressions may be used:

[0025] It may be noted that "side-by-side" may be an expression meaning "on the same screen" or in the same window. It may say nothing about the layout of the screen. One window or portlet may be above another one. However, side-by-side may express more a time-wise dependency. A user may recognize both elements displayed side-by-side at the same time. The user may also use the elements without limitations.

[0026] It may be noted that the immediate use, usability or, execute-ability of an execution flow path of portal resources may apply to the administrative user who may still be using the portal application development system or, any other user having access to the port of system.

[0027] "Providing access to the portal resources" may mean that an administrator user may have access to data components or resources, in particular portal resources. This may apply directly to all portal resources of the Web navigational user interface.

[0028] The term "visually modeling screen-flows" may denote the capability of editing a sequence of different views of portal resources rendered in a portal of a portal system. Different views may be chained into an execution flow path. Such an editing may be supported electronically such that the different screens may be visible and manipulative using graphical tools.

[0029] The term "portal resources" may denote any displayable content, input form or, displayable computing result. The resources may typically be handled as portlets of a portal system. The data for content to be displayed in a portal may originate from any application or data source. Besides portlets, also complete portal pages may be treated as a resource. Portlets may be seen as pluggable user interface software components which are managed and displayed in a Web portal. The portlets may produce fragments of mark-up language code—e.g., HTML, XHTML, WMF—which may be aggregated into a portal system. A portal page may be displayed as a collection of non-overlapping portlet windows displayed as portlets.

[0030] The term "portal system" may denote a plurality of components allowing a user to navigate in a graphical user interface by a pointing device, a management of portal pages and portlets, and in particular, a back-end administration system to manage pages, content, screen-flows, access control as well as a database to store related information items.

[0031] The term "execution flow path" may denote a sequence of displayed and/or navigable views within a portal system. The sequence may be predefined.

[0032] The term "portal page" may denote the completeness of information windows displayed within a portal system user interface.

[0033] The term "portlet" may denote a pluggable user interface software component which may be managed and displayed in a Web portal which has already been defined above in the context of portal resources.

[0034] The term "connectable" may denote the feature to link original separate views or screens into a linked or connected flow of the different views or portal resources. Thus, if portal resources may be connected to each other in an execution flow path they may be accessible one after the other automatically in the right sequence.

[0035] The term "graphical modeling tool" may denote—in this context—a component of a graphical user interface allowing developing an execution flow path combining a plurality of portal resources.

[0036] The term "Web navigational user interface" may denote the general concept of a Web browser. It may allow users to navigate within a displayed Web page using a pointing device, wherein in the displayed Web page may comprise the rendered output of a portal (back-end) system.

[0037] The term "portal resources to be collected" may denote portal resources which may be eligible to be connected in an execution flow path. The portal resources to be collected may be visible within the Web navigational user interface. Consequently, they may be selectable using the pointing device. This may be a prerequisite to manage the portal resources with a drag-and-drop functionality. Thereby, the drag-and-drop functionality may comprise a pointing device gesture in which a user may selects a virtual object by "grabbing" it and dragging it to a different location or onto another virtual object.

[0038] Embodiments for visually modeling screen-flows and the related system may offer a couple of advantages:

[0039] Using a tool related to the proposed method, a developer, e.g., an administrator user may stay within active portal resources when developing a portal application. I.e., he may have full access to all resources of a given portal and may, in addition, have access to one or more portlet development tools for combining innovatively the portal resources—i.e., portal pages and/or portlets—into a new execution flow path of portal resources. This means that the administrator user may navigate through existing portals and portlets while at the same time having access to a portal development tool. No special development environment, separate to the available portal resources, may have to be launched.

[0040] Traditional Web development environments typically require a special development view onto the available resources. In such a mode, navigation within and between the portal resources may not be possible. Thus, in such a traditional mode there may be a disconnection between the available resources during development time.

[0041] In contrast to this, embodiments may allow an in-line development, wherein both, the developmental environment and the portal resources may be accessible and fully navigable. Thus, the administrator user may have full control of all portal resources in a user mode also during development time.

[0042] At the end of a development cycle, an execution flow path may be available for immediate use by the administrator user for an immediate test. This way, the administrator user may not have to leave the developmental environment for a test of the developed portal application. Alternatively, the execution flow path may also immediately be available for a test user or regular user. This way, prototyping of new Web applications may be more productive if compared to the traditional method.

[0043] According to one embodiment, the last navigated resource which has been activated before the graphical modeling tool may have been activated, may continue to stay active. This way, the graphical modeling tool for developing new Web applications, i.e., a new execution flow path, and the available resources, i.e., portal pages and/or portlets, may be active at the same time with full control by the administrator user.

[0044] Further embodiments may comprise providing search functionality in an administrator selection user interface for portal resources. This feature may allow searching for specific portal pages or portlets within the pool of available resources. This way, it may not be required to search manually for specific resources. The speed of development may be increased.

[0045] According to an additional embodiment, icons of portal resources may be selectable within the administrator selection user interface. They may also be draggable into the defined collation mode area. Using this feature, an administrator user or developer may not be required to navigate through all available resources for developing a new Web application. Instead, he may only pick and choose—i.e., drag-and-drop—available portal resources into the defined collection mode area. Again, this may speed up the development process.

[0046] According to an embodiment, beside the search functionality and the icons of portal resources also the last navigated resource, which may have been activated by the administrator user, may continue to stay active. This may happen in parallel and side-by-side to an activation of the graphical modeling tool side by side with the defined collection mode area. Thus, the active resource(s) as well as the graphical modeling tool, i.e., the collection mode, may be active on the same screen, i.e., the same Web navigational user interface. Thus, an administrator user may have full control of all resources and related applications in addition to the portal application development system because also the portal application development system may be treated as a resource within the same portal system.

[0047] This means that a navigation and interaction with the portal resources may continue to be activated even if the graphical modeling tool has been activated. Thus, new portal applications may be developed very intuitively and in short time frames.

[0048] According to one embodiment, the mapping of selected data fields of the selected and connected portal resources may be performed using the drag-and-drop functionality. This way, variables which a user may have typed in a portal or portlet form may be transferable from one portlet to another portlet, i.e., from output fields to input fields. The dragging and dropping of related fields of different and/or successive portlets may enhance the development speed of new Web applications. Automatic data field format tests may be included in this drag-and-drop functionality in order to avoid format mismatches. This may be an additional guiding help for the administrator user.

[0049] Furthermore, embodiments may take the form of a computer program product, accessible from a computer-usable or computer-readable medium providing program code for use, by or in connection with a computer or any instruction execution system. For the purpose of this description, a computer-usable or computer-readable medium may be any apparatus that may contain means for storing, communicating, propagating or transporting the program for use, by or in a connection with the instruction execution system, apparatus, or device.

[0050] The medium may be an electronic, magnetic, optical, electromagnetic, infrared or a semi-conductor system for a propagation medium. Examples of a computer-readable medium may include a semi-conductor or solid state memory, magnetic tape, a removable computer diskette, a random access memory (RAM), a read-only memory (ROM), a rigid magnetic disk and an optical disk. Current examples of optical disks include compact disk-read only memory (CD-ROM), compact disk-read/write (CD-R/W), DVD and Blu-Ray-Disk.

[0051] It should also be noted that embodiments of the invention have been described with reference to different subject-matters. In particular, some embodiments have been described with reference to method type claims whereas other embodiments have been described with reference to apparatus type claims. However, a person skilled in the art will gather from the above and the following description that, unless otherwise notified, in addition to any combination of features belonging to one type of subject-matter, also any combination between features relating to different subject-matters, in particular, between features of the method type claims, and features of the apparatus type claims, is considered as to be disclosed within this document.

[0052] In the following, a detailed description of the figures will be given. All instructions in the figures are schematic. Firstly, a block diagram and handling diagrams of an embodiment of a method for visually modeling screen-flows is given. Afterwards, further embodiments of the portal application development system will be described.

[0053] FIG. **1** shows an overview block diagram of an embodiment of a method **100** for visually modeling screen-flows by connecting portal resources **212** of a portal system **1000** for creating an execution flow path for immediate use, in particular, during runtime of the portal system **1000** by a user.

[0054] The portal resources **212** are portal pages **1016** and portlets **1018**, which are selectively connectable using a graphical modeling tool **206**. The graphical modeling tool **206** is driven by a graphical modeling tool module **1006** and is integrated as one of the portal resources **212** and accessible via a related Web navigational user interface **200** of the portal system **1000**. The method **100** comprises activating, **102**, the graphical modeling tool **206** resulting in a collection mode of the Web navigational user interface **200** which is characterized by providing, **104**, a defined collection mode area **204** within the Web navigational user interface **200**, side by side with the portal resources **212**, to be collected. This means that the defined collection mode area may be rendered together with the last page the administrator user has navigated to and/or will be navigating successively in the portal system **1000**. The collection mode may stay active independently of whereto the administrator user navigates.

[0055] The method **100** may also comprise providing, **106**, access to the portal resources **212**, in particular to its data, meta data and/or components, i.e., resources, within the Web navigational user interface **200**.

[0056] There may also be a providing, **108**, a drag-and-drop functionality within the Web navigational user interface **200** and a selecting, **110**, portal resources **212** within the Web navigational user interface **200** to be connected. For this, the drag-functionality may be used and the selected portal resources **212** may then be dropped into the defined collection mode area **204** of the Web navigational user interface **200** using the drop-functionality.

[0057] The method **100** may also allow a switching, **112**, into an assembly mode of the Web navigational user interface **200**, which may be characterized by providing, **114**, an assembly mode area **600**, and providing, **116**, a connection user interface **630**. The selected portal resources **610**, . . . , **624** may be connectable selectively using the connection user interface **630**, and data fields of the selected and connected portal resources **610**, . . . , **624** may be selectively mapped to each other for an immediate life navigation using a mapping user interface.

[0058] This mapping may either be performed by directly typed names or identifiers of corresponding fields of related, chained portal resources **610**, . . . , **624** into an input field or, alternatively, by dragging source data fields of a portal page to an input data field of a successive portal page. The mapping may also be performed supported by metadata in that fields with identical metadata may be mapped automatically to each other.

[0059] This way, an execution flow path **1038** of the connected portal resources **610**, . . . , **624** may be created, which may then be stored, **118**, as a new portal resource **212** in the portal system **1000** for immediate use by either the administrator user for a direct test, by a tester or, by a normal user. Prototyping may become much more productive this way. And the prototypes may be transformed into a productive mode immediately.

[0060] FIG. **2** shows an embodiment of a screen layout with a graphical modeling tool and portal resources. A Web navigational user interface **200** may comprise navigational arrows (as shown on the top left side) and an input field **202** for a Web address, here, e.g., http://www.ibm.com/projects/screen-flow-mgmt. In the bottom area of the Web navigational user interface **200** is a "normal" application (in the sense of an end user application and not a development tool) displayed. As an example, traveler flight, hotel, and car booking systems are used. Also different portal resources **212** in the form of portlets are shown. Moreover, application links **210** may be displayed as part of the booking systems.

[0061] In the top half of the Web navigational user interface **200** the graphical modeling tool **206** screen area may be displayed. It may comprise a tool bar **208** and the defined collection mode area **204**. The graphic in the modeling tool **206** screen area may be resized as appropriate.

[0062] FIG. **3** shows an embodiment of how portal resources **212** are collected in the defined collection mode area **204**. The graphical representation of the modeling tool screen area **206** may comprise one or more lanes **302** into which portal resources **212** or application links **210** may be dragged and dropped as illustrated by the arrows **304** and **306**.

[0063] FIG. **4** shows another embodiment of how portal resources **212** are collected in the defined collection mode area **204**. In this case, the second lane **302** besides the one already shown in FIG. **3** may comprise additional portal resources. Here, "flight bookings" and the "flight booking portal **2**" are dragged and dropped from the bottom area of the Web navigational user interface **200** in the defined collection mode area **204** of the Web navigational user interface **200**. This is shown by arrows **402** and **404**.

[0064] FIG. **5** shows an embodiment of how icons **508** and a search function **502** may be integrated into the Web navigational user interface **200**. In this view, not the complete portlets as shown in the previous figures are displayed, but only icons **508** of these portlets in the area **500**. They may be filtered by different menu functions **504** for "all portlet resources", **506** for "administrative portlets" or, **507** for "collaborative portlets", and so on. The view may not be as interactive as the firstly described version and may be better suited to both for a professional Web application developer. However, the proposed method may allow both modes of operation.

[0065] FIG. **6** shows an embodiment of a layout and function of the assembly mode. Different lanes **302** are shown side-by-side in the portal. Portal resources **212** may no longer be visible. Instead, a connection user interface **630** together with a related tool bar **208** is shown. Included into the lanes **302** are already selected portal resources **610**, . . . , **624**. Reference numerals **610**, **614**, **618**, and **622** may denote one of the application links **210** as introduced in FIG. **2**. Reference numerals **612**, **616**, **620**, **624** may denote related portlets. Using the connection user interface **630**, portlets **612** may be linked to application **614** as shown by an arrow **602**. Similarly, displayed portal resources **616** and **618**—connected by an arrow **604**—as well as **620** and **622**—connected by arrow **606**—may be linked or chained within the assembly mode area **600**. In this view, also the application links **210** may be included.

[0066] This way, different portal resources of different and separate portal applications may be linked together within a graphical user interface providing an elegant and intuitive way to chain originally separated applications or application components into a new screen-flow or execution flow path.

[0067] FIG. **7** shows the first part of a detailed block diagram **700** of an embodiment of a method. **702**, an administrator user may navigate into a portal user interface, i.e., the Web navigational user interface **200**. Then, **704**, the administrator user may decide to create a new screen-flow. The administrator user may enable, **706**, the collection mode of the screen-flow modeler. At **708**, the portal system may insert the screen-flow portlet into the current navigation view. The portal system **1000** may continue to provide, **710**, live access to portal resources that are available in the portal system for a screen-flow assembly, as discussed in the context of FIGS. **2** to **6**. At **712**, the administrator user keeps on navigating through the Web navigational user interface as he would have done without the screen-flow modeler. In parallel, **714**, the administrator user and may add the desired portal resources **212**, i.e., portlets and pages to the lanes of the screen-flow modeler via drag-and-drop. This may be a recursive process. Afterwards, the administrator user may switch the portal application development system, shown as a computer **900** in FIG. **9**, into the screen-flow assembly mode, **716**.

[0068] FIG. **8** shows the second part of a detailed block diagram **700** of an embodiment of a method. At **802**, the administrator user may decide that a transition between resources **610**, . . . , **624**, as discussed in the context of FIG. **6**, may be performed. The screen-flow modeler may detect, **804**, available configuration options based on the life data and metadata available through the portal system. This may, e.g., be applicable for input and output fields of a specific portal resource pair. At **806**, the screen-flow modeler may display an input dialog to allow a configuration of the current transition including input and output fields of portlets **1016**. A mapping of output fields to input fields of successive portlets **1016** or portal resources **212** may be performed by a drag-and-drop functionality. At **808**, the administrator user may decide to save the current transition from one portlet to another, at which point, the screen-flow modeler may persist the transition in form of a portion of an execution flow path **1038** which may become active immediately for use, **810**. After the complete execution flow path **1038** may have been created, the administrator user may decide to save the complete screen-flow or execution flow path **1038** he just assembled, **812**. At **814**, the screen-flow may store the complete definition of the screen-flow in the portal data store **1016**.

[0069] FIG. **10** shows a block diagram of a portal system **1000** with elements of the proposed expansion regarding visually modeling screen-flows in a component-oriented Web-based system.

[0070] A traditional portal system **1000** may comprise a driver **1002** for a Web navigation user interface **200** module, portal pages **1016**, portlets **1018** with communication endpoints **1020**, a modeler API **1014** (application programming interface) and, some administration components **1022**. These may comprise a page management component **1024**, a deployment module **1026**, a content management module **1028**, an access control component **1030** and a screen-flow administration module **1032**. Additionally, the portal system **1000** may comprise a portlet data store **1034** and an execution flow path data store **1036** in which individual screen-flows or execution flow path **1038** may be stored.

[0071] Also shown in FIG. **10** is an extension to the traditional portal system building a portal application development system **920**. It may comprise a graphical modeling tool module **1006**. It may comprise a couple of additional modules: a drag-and-drop module **1008** may be adapted for selecting portal resources **212**, **610**, . . . , **624**, e.g., portlets **1018** or portal pages **1016** or data fields of portlets. The drag-and-drop module **1008** may also be adapted together with a collection user interface module **1010** to move portal resources **212** into the defined collection mode area **204**, represented by reference numeral **1004** in FIG. **10**, or to connect selected portal resources **610**, . . . , **624** within the assembly mode area **600**. The same drag-and-drop module **1008** may be used for selectively mapping input and output fields of portlets **1018** when connected to them.

[0072] A connection user interface module **1012** may be adapted for connecting selected portal resources **610**, . . . , **624**, as described above. This module may also be supported by the drag-and-drop module **1008**. The assembled and connected screen-flow of execution flow path **1038** may be stored in the execution flow path data store **1036**. This may also be performed by the screen-flow connection user interface module **1012** as shown in FIG. **10** by arrow **1040**.

[0073] Embodiments of the invention may be implemented together with virtually any type of computer, regardless of the platform being suitable for storing and/or executing program code. For example, as shown in FIG. **9**, a computing system may be a computer **900** including one or more processor(s) **902** with one or more cores per processor, associated memory elements **504**, an internal storage device **506** (e.g., a hard disk, an optical drive, such as a compact disk drive or digital video disk (DVD) drive, a flash memory stick, a solid-state disk, etc.), and numerous other elements and functionalities, typical of today's computers (not shown). The memory elements **904** may include a main memory, e.g., a random access memory (RAM), employed during actual execution of the program code, and a cache memory, which may provide temporary storage of at least some program code and/or data in order to reduce the number of times, code and/or data must be retrieved from a long-term storage medium or external bulk storage **916** for an execution. A disk **906** may be designated for longer-term storage, such as a non-volatile memory disk. Elements inside the computer **900** may be linked together by means of a bus system **918** with corresponding adapters. Additionally, the portal application development system **920** may be attached to the bus system **918**. Storage elements of the portal system—e.g., **1034**, **1036**—and the computing system may be shared.

[0074] The computer **900** may also include input means, such as a keyboard **908**, a pointing device such as a mouse **910**, or a microphone (not shown). Alternatively, the computing system may be equipped with a touch sensitive screen as main input device. Furthermore, the computer **900**, may include output means, such as a monitor or screen **912** [e.g., a liquid crystal display (LCD), a plasma display, a light emitting diode display (LED), or cathode ray tube (CRT) monitor]. The computer **900** may be connected to a network (e.g., a local area network (LAN), a wide area network (WAN), such as the Internet or any other similar type of network, including wireless networks via a network interface connection **914**. This may allow a coupling to other computer systems or a storage network or a tape drive. Those, skilled in the art will appreciate that many different types of computer systems exist, and the aforementioned input and output means may take other forms. Generally speaking, the computer **900** may include at least the minimal processing, input and/or output means, necessary to practice embodiments of the invention.

[0075] Embodiments relate to methods, systems, computer program products, or apparatuses for visually modeling screen-flows.

[0076] According to one aspect, a method for visually modeling screen-flows is performed by connecting portal resources of a portal system for creating an execution flow path for immediate use. The method includes activating a graphical modeling tool to activate a collection mode of a Web navigational user interface. The graphical modeling tool is integrated as one of the portal resources and accessible via a related Web navigational user interface of the portal system. The collection mode includes a defined collection mode area within the Web navigational user interface side by side with the portal resources to-be-collected. The portal resources include portal pages and portlets, and the portal resources are connectable selectively using the graphical modeling tool. The collection mode provides access to the portal resources within the Web navigational user interface, and the collection mode provides drag-and-drop functionality. The method includes selecting portal resources within the Web navigational user interface. The portal resources to-be-collected are selected using the drag-and-drop functionality by dragging the portal resources and dropping the portal resources into the defined collection mode area of the Web navigational user interface. The method includes switching into an assembly mode of the Web navigational user interface. The assembly mode is characterized by providing an assembly mode area and providing a connection user interface. The selected portal resources are connectable selectively using the connection user interface. The data fields of the selected and connected portal resources are selectively mapped to each other for an immediate navigation, using a mapping user interface resulting in an execution flow path of the connected portal resources. The method further includes storing the execution flow path as a portal resource in the portal system for immediate use.

[0077] According to another aspect, a portal application development system includes memory and a processor for visually modeling screen-flows by connecting portal resources of a portal system for creating an execution flow path for immediate use. The system includes an activation unit adapted for activating a graphical modeling tool module driving a graphical modeling tool, in response to an activation signal, resulting in a collection mode of a Web navigational user interface. The collection mode is configured to provide a defined collection mode area within the Web navigational user interface side by side with portal resources to be collected. The portal resources are portal pages and portlets, and the portal resources are connectable by means of using a graphical modeling tool. The graphical modeling tool is integrated as one of the portal resources and is accessible via a related Web navigational user interface driven by user interface module of the portal system. The collection mode is further configured to provide access to the portal resources within the Web navigational user interface. The system includes a drag-and-drop module for selecting portal resources within the Web navigational user interface. The portal resources to be collected using a drag functionality of the drag-and-drop module and adapted for dropping them into the defined collection mode area of the Web navigational user interface using a drop-functionality of the drag-and-drop module. The system includes a collection user interface module adapted for collecting selected portal resources in the defined collection mode area. The system includes a switching unit adapted for switching the graphical modeling tool module, in response to an assembly mode switching signal, into an assembly mode for the Web navigational user interface. The system includes a connection user interface module. The selected portal resources are connected by means of the connection user interface module within an assembly mode area. The data fields of the selected and connected portal resources are selectively mapped to each other for an immediate life navigation using a mapping user interface module resulting in an execution flow path of the connected portal resources. The system includes a storage module adapted for storing the execution flow path as a portal resource in the portal system for immediate use.

[0078] According to another aspect, a computer program product for visually modeling screen-flows by connecting portal resources of a portal system for creating an execution flow path for immediate use includes a computer readable storage medium having program instructions embodied therewith. The computer readable storage medium is not a transitory signal per se. The program instructions are executable by a processor to cause the processor to perform a method. The method includes activating a graphical modeling tool to activate a collection mode of a Web navigational user interface. The graphical modeling tool is integrated as one of the portal resources and accessible via a related Web navigational user interface of the portal system. The collection mode includes a defined collection mode area within the Web navigational user interface side by side with the portal resources to-be-collected. The portal resources include portal pages and portlets, and the portal resources are connectable selectively using the graphical modeling tool. The collection mode provides access to the portal resources within the Web navigational user interface, and the collection mode provides drag-and-drop functionality. The method includes selecting portal resources within the Web navigational user interface. The portal resources to-be-collected are selected using the drag-and-drop functionality by dragging the portal resources and dropping the portal resources into the defined collection mode area of the Web navigational user interface. The method includes switching into an assembly mode of the Web navigational user interface. The assembly mode is characterized by providing an assembly mode area and providing a connection user interface. The selected portal resources are connectable selectively using the connection user interface. The data fields of the selected and connected portal resources are selectively mapped to each other for an immediate life navigation, using a mapping user interface resulting in an execution flow path of the connected portal resources. The method further includes storing the execution flow path as a portal resource in the portal system for immediate use.

[0079] The portal application development system may also comprise a providing unit adapted for providing an assembly mode area and a connection user interface module. The selected portal resources may be connected by means of the connection user interface module, wherein data fields of the selected and connected portal resources may be mapped selectively to each other for an immediate life navigation using a mapping user interface module resulting in an execution flow path of the connected portal resources.

[0080] While the invention has been described with respect to a limited number of embodiments, those skilled in the art, having benefit of this disclosure, will appreciate that other embodiments may be devised, which do not depart from the scope of the invention, as disclosed herein. Accordingly, the scope of the invention should be limited only by the attached claims. Also, elements described in association with different embodiments may be combined. It should also be noted that reference signs in the claims should not be construed as limiting elements.

[0081] As will be appreciated by one skilled in the art, aspects of the present disclosure may be embodied as a system, method or computer program product. Accordingly, aspects of the present disclosure may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a "circuit," "module" or "system." Furthermore, aspects of the present disclosure may take the form of a computer program product embodied in one or more computer readable medium (s) having computer readable program code embodied thereon.

[0082] Any combination of one or more computer readable medium(s) may be utilized. The computer readable medium may be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any tangible medium that may contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

[0083] A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electro-magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that may communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device.

[0084] Program code embodied on a computer readable medium may be transmitted using any appropriate medium, including but not limited to wireless, wireline, optical fiber cable, RF, etc., or any suitable combination of the foregoing.

[0085] Computer program code for carrying out operations for aspects of embodiments the present invention may be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Smalltalk, C++ or the like and conventional procedural programming languages, such as the "C" programming language or similar programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider).

[0086] Aspects of the present disclosure are described with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products according to embodiments of the present disclosure. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, may be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0087] These computer program instructions may also be stored in a computer readable medium that may direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions stored in the computer readable medium produce an article of manufacture including instructions, which implement the function/act specified in the flowchart and/or block diagram block or blocks.

[0088] The computer program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer implemented process such that the instructions, which execute on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0089] The block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present disclosure. In this regard, each block in the block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions discussed hereinabove may occur out of the disclosed order. For example, two functions taught in succession may, in fact, be executed substantially concurrently, or the functions may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams, and combinations of blocks in the block diagrams, may be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

[0090] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to limit of the invention. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0091] The corresponding structures, materials, acts, and equivalents of all means or steps plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements, as specifically claimed. The description of the embodiments of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skills in the art without departing from the scope and spirit of the invention.

1. A method comprising:

selecting portal resources of a portal system within a graphical modeling tool;

mapping data fields of the selected portal resources to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources; and

storing the execution flow path as a portal resource in the portal system.

2. The method of claim **1**, wherein the portal resources include portal pages and portlets.

3. The method according to claim **1**, wherein a last navigated resource, having been activated before the selecting, continues to stay active during the selecting.

4. The method according to claim **1**, wherein the method further comprises providing search functionality in an administrator selection user interface for portal resources.

5. The method according to claim **4**, wherein in the administrator selection user interface icons of portal resources are selectable.

6. The method according to claim **5**, wherein a last navigated resource, having been activated before the selecting, continues to stay active side by side with the collection mode area.

7. The method according to claim **1**, wherein a navigation and interaction with the portal resources continues to be activated during the selecting.

8. The method according to claim **1**, wherein the mapping is performed using a drag-and-drop functionality.

9. A system comprising a processing unit and a memory, the system configured to:

select portal resources of a portal system within a graphical modeling tool;

map data fields of the selected portal resources to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources; and

store the execution flow path as a portal resource in the portal system.

10. The system according to claim **9**, wherein the portal resources include portal pages and portlets.

11. The system according to claim **9**, wherein a last navigated resource, having been activated before the selecting, continues to stay active during the selecting.

12. The system according to claim **9**, wherein the system is further configured to provide search functionality in an administrator selection user interface for portal resources.

13. The system according to claim **12**, wherein in the administrator selection user interface icons of portal resources are selectable.

14. The system according to claim **13**, wherein a last navigated resource, having been activated before the selecting, continues to stay active side by side with the collection mode area.

15. The system according to claim **9**, wherein a navigation and interaction with the portal resources continues to be activated during the selecting.

16. The system according to claim **9**, wherein the mapping is performed using a drag-and-drop functionality.

17. A computer program product comprising a computer readable storage medium having program instructions embodied therewith, wherein the computer readable storage medium is not a transitory signal per se, the program instructions executable by a processor to cause the processor to perform a method, comprising:

selecting portal resources of a portal system within a graphical modeling tool;

mapping data fields of the selected portal resources to each other using the graphical modeling tool to generate an execution flow path of the selected portal resources; and

storing the execution flow path as a portal resource in the portal system.

18. The computer program product of claim **17**, wherein the portal resources include portal pages and portlets.

19. The computer program product of claim **17**, wherein a last navigated resource, having been activated before the selecting, continues to stay active during the selecting.

20. The computer program product of claim **17**, wherein the system is further configured to provide search functionality in an administrator selection user interface for portal resources.

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